

WHAT IS CLAIMED IS:

1. A device manufacturing method comprising:
providing a first substrate having a first and second surface on a first and second
5 side thereof, respectively;
patterning said first surface of said first substrate with at least one reversed
alignment marker;
providing a protective layer over said at least one reversed alignment marker;
bonding said first substrate to a second substrate with said first side of said first
10 substrate facing said second substrate;
locally etching said first substrate as far as said protective layer to form a trench
around said at least one reversed alignment marker; and
forming at least one patterned layer on said second surface of said first substrate
using a lithographic projection apparatus having a front-to-backside alignment system
15 while aligning said first substrate to said at least one reversed alignment marker revealed
by each of said trench.
2. The method of Claim 1, wherein said protective layer comprises a
material selective against the etch used to form each trench in order to form an etch stop
20 layer.
3. The method of Claim 2, wherein said protective layer material comprises
SiO₂.
- 25 4. A device manufactured by the method of Claim 3.
5. The method of Claim 1 wherein, prior to said bonding, forming a
reflective layer over said protective layer to increase visibility of said at least one reversed
alignment marker when revealed by said trench.
- 30 6. The method of Claim 5, wherein said reflective layer comprises Al.

7. A device manufactured by the method of Claim 6.

8. The method of Claim 5 wherein, prior to said bonding, forming devices
5 on said first surface.

9. A device manufactured by the method of Claim 7.

10. The method of Claim 5, wherein at least one of said protective layer and
10 reflective layer is formed as part of device layers having intervening layers locally removed.

11. A device manufactured by the method of Claim 10.

12. The method of Claim 10, wherein normal alignment markers for use in
15 aligning the structures in or on said first surface are printed in the same method as said at least one reversed alignment marker.

13. The method of Claim 1, wherein said locally etching further comprises,
20 forming an etch-resistant layer on said second surface,
providing a layer of radiation-sensitive resist on said etch-resistant layer,
patterning and developing said radiation-sensitive resist so as to form openings
above said at least one reversed alignment marker, and
removing said etch-resistant layer in said openings.

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14. A device manufactured by the method of Claim 13.

15. The method of Claim 1 wherein, after said bonding, further comprising
reducing thickness of said first substrate.

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16. The method of Claim 12, wherein said normal alignment markers are patterned using the same apparatus as is used for patterning the process layers.

17. The method of Claim 1, wherein said forming at least one patterned layer on said second surface includes forming at least one additional alignment marker at a known position relative to said at least one reversed alignment marker revealed by said trench.

18. A device manufactured by the method of Claim 17.

19. A device manufacturing method comprising:
providing a first substrate having a first surface on a first side and a second surface on a second side;

patterning said first surface of said first substrate with at least one first marker and at least one second marker, said second marker having reverse attributes of said first marker;

providing a protective layer over said at least one second marker;

bonding said first substrate to a second substrate with said first side of said first substrate facing said second substrate;

locally etching said first substrate as far as said protective layer to form a trench around said at least one second marker; and

forming at least one patterned layer on said second surface of said first substrate by aligning said first substrate to said at least one second marker revealed by each of said trench.

20. The method of Claim 19, wherein said protective layer comprises a material selective against the etch used to form each trench in order to form an etch stop layer.

21. The method of Claim 20 wherein, prior to said bonding, forming a reflective layer over said protective layer to increase visibility of said at least one second marker when revealed by said trench.

5 22. The method of Claim 21 wherein, prior to said bonding, forming devices on said first surface.

10 23. The method of Claim 22, wherein at least one of said protective layer and reflective layer is formed as part of device layers having intervening layers locally removed.

24. The method of Claim 10, wherein said at least one first marker are produced in the same method as said at least one second marker.

15 25. The method of Claim 19, wherein said locally etching further comprises, forming an etch-resistant layer on said second surface, providing a layer of radiation-sensitive resist on said etch-resistant layer, patterning and developing said radiation-sensitive resist so as to form openings above said at least one second marker, and
20 removing said etch-resistant layer in said openings.

25 26. The method of Claim 19, wherein said forming at least one patterned layer on said second surface includes forming at least one additional of a first and second marker at a known position relative to said at least one second marker revealed by said trench.